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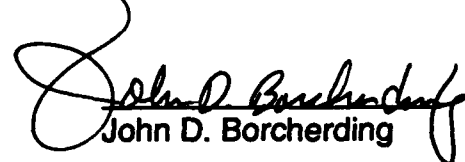


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AN ANALYSIS OF AVAILABILITY FACTORS USED IN  
NAVAL MOBILE CONSTRUCTION BATTALION  
PROJECT PLANNING

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NAVAL MOBILE CONSTRUCTION BATTALION  
PROJECT PLANNING**

by

**MARK REYNOLDS LIBONATE, B.S.**

**DEPARTMENTAL REPORT**

**Presented to the Faculty of the Graduate School of  
The University of Texas at Austin  
in Partial Fulfillment  
of the Requirements  
for the Degree of**

**MASTER OF SCIENCE IN ENGINEERING**

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## **CHAPTER 1**

### **Introduction**

#### **1.1 Statement of Intent.**

In the planning of construction projects to be completed by U.S. Naval Mobile Construction Battalions (NMCB's), it is necessary to estimate the amount of time that direct labor personnel are actually available on the project site. To accomplish this, an availability factor is used during the calculation of the man-day capability of a deploying NMCB. The factor is intended to account for the amount of time which direct labor personnel spend on activities other than direct labor, such as medical and dental visits, leave, liberty, collateral duties and inspections. The availability factor, previously called a site efficiency factor, is a function of both the location of the NMCB's project tasking and also the manner in which the Battalion carries out its daily activities. Traditionally, site specific availability factors have been established from the man-day expenditure analysis presented at the end of each Battalion's deployment. In the past, an availability factor of .80, representing that a worker is available on the job for 80% of the workday, had been accepted as the norm for NMCB mainbody sites (CBPAC/CBLANTINST 5200.2A 1991b). In recent years, the trend has been to expand the range of the factor to 75% to 85% (CECOS 1992; NMCB-74 45 Day Review Final 1993).

The intent of this study is to evaluate the validity of the range of availability factors currently being used at NMCB mainbody sites. To

accomplish this, a "grass roots" availability factor will be derived using survey input from the direct labor personnel and Operations Department of a deployed Battalion. This factor will be compared with availability factors calculated from recently reported man-day expenditure data. Conclusions and recommendations will be drawn from this comparison and from a review of the current Navy guidance concerning the calculation and use of availability factors.

#### 1.2 Definition and Assumptions.

It is prudent to establish a concise definition of an availability factor at the beginning of the study. In the strictest definition, the availability factor is one which accounts for all lost time associated with direct labor personnel not being physically present on the job site. A more liberal definition would include all of the lost time during the work day. The author suggests the best definition falls somewhere in between. The author defines an availability factor to account for all time within the workday during which direct labor personnel are not engaged in activities considered to be direct labor. A brief investigation into the activities which may produce lost direct labor time during the workday will provide a clearer understanding of the activities included by the author's definition.

A literature survey of current NCB instructions, Civil Engineer Corps Officer School (CECOS) student guides and Naval Facilities Engineering Command (NAVFAC) planning guides reveals no definitive list of activities accounted for by an availability factor. In certain instances, as with travel,



one manual will list an activity as being accounted for, or not accounted for, by an availability factor and other guidance will specifically contradict this assertion. A consensus can be found to include lost time from the following activities in the calculation of an availability factor:

Leave	Uniform Inspections
Military Gear Issue	Quarters
Indoctrination Programs	Personal Time (Haircuts, etc.)
Paydays	Duty/Watches
Admin and Legal Visits	Collateral Duties
Medical and Dental Visits	Special Liberty

Several activities which fall into a gray area and require further investigation include travel time, job site safety lectures and breaks. While travel time and safety lectures are activities which diminish the amount of a laborer's available time to produce work in place, they are specifically identified in the time keeping procedures as direct labor (CBPAC/CBLANTINST 5312.1A 1990). Though breaks, excluding lunch, are not specifically addressed in the time keeping procedures, they are normally counted as direct labor. Following the author's definition, these activities will not be incorporated into the availability factor that is developed. This deletion is also necessary to ensure an apple to apple comparison with the availability factors currently used and calculated from man-day expenditure data.

Three activities which will be taken into account, but not specifically listed in any of the Navy guidance, are lost time due to transferring personnel, safety mishaps/accidents and disciplinary actions. All of these are activities which may affect the ability of direct labor personnel to actually produce direct labor.

## **CHAPTER 2**

### **Background**

#### **2.1 Naval Construction Force Organization.**

In order to provide a better understanding of the context in which availability factors are used, it is necessary to present a brief overview of the Naval Construction Force (NCF). The term Naval Construction Force refers to the group of naval organizational components which possess the capability to construct, maintain, and operate, both in wartime and peacetime, a myriad of facilities in support of the U.S. Navy and U.S. Marine Corps. These NCF units are comprised of officers of the Civil Engineer Corps (CEC) and enlisted personnel, commonly known as Seabees, trained in construction skills. Figure 2.1 provides a simplified representation of the peacetime NCF organizational structure. While the use of an availability factor during construction planning is common practice throughout the NCF, this report looks at its use by two specific NCF organizations, the Naval Construction Brigade (NCB) and the Naval Mobile Construction Battalion (NMCB). (NAVFAC P-315 1985).

A Naval Construction Brigade is comprised of a commander and his staff and exercises administrative and operational control over other NCF units operating in a specific geographic area or in support of a specific military operation (NAVFAC P-315 1985). There are currently two Brigades. The 2nd NCB is responsible for operations in the Atlantic arena and the 3rd NCB is responsible for operations in the Pacific arena.

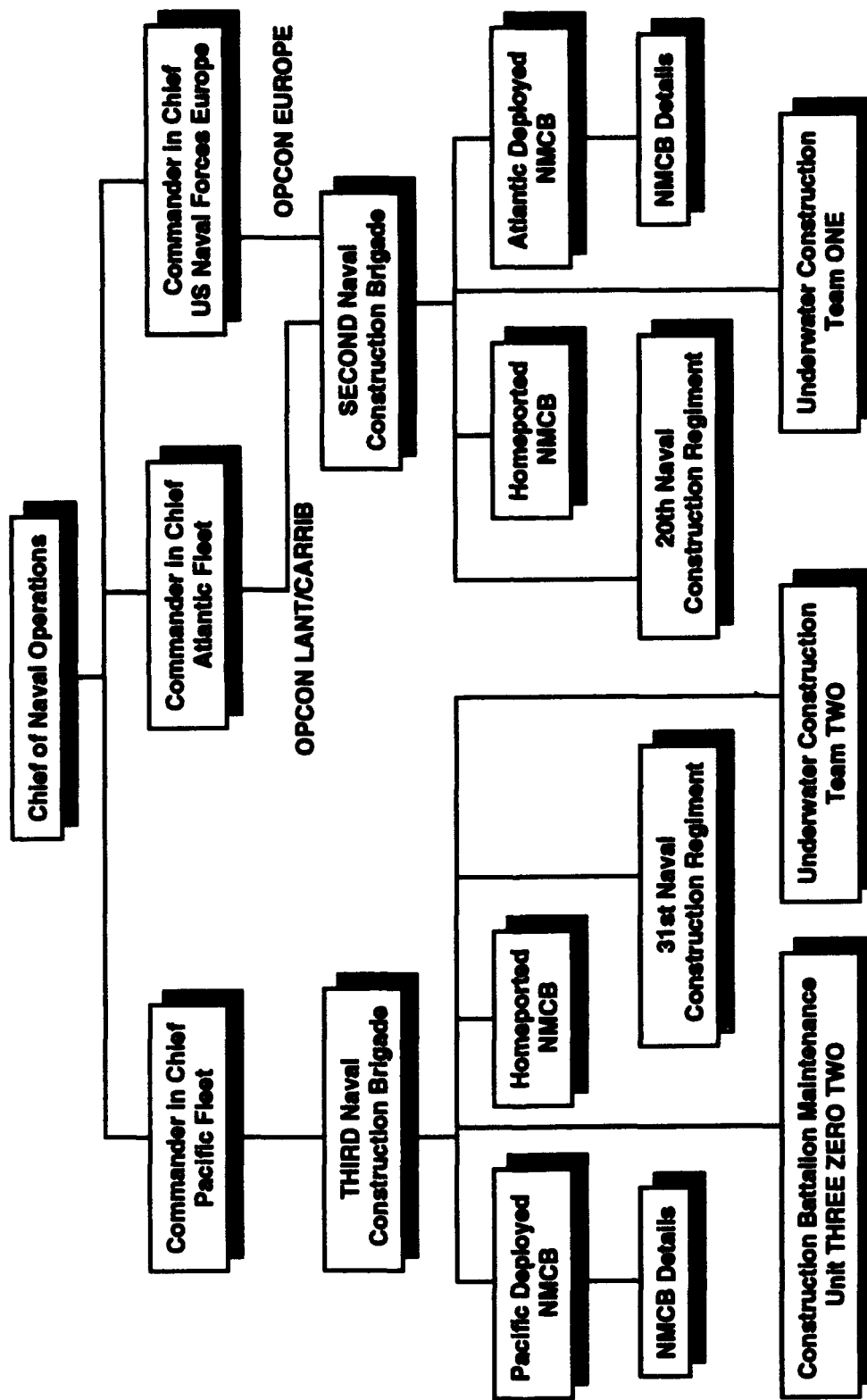


Figure 2.1 NAVAL CONSTRUCTION FORCE ORGANIZATION

The NCB provides policy and guidance to all units under their control. For NMCB's operating under their cognizance, the NCB coordinates and schedules their employment and deployed construction tasking.

A Naval Mobile Construction Battalion (NMCB) is a unit comprised of approximately 21 Naval officers and 550 to 600 Seabees. The mission of a Battalion is to provide construction support to Naval, Marine Corps and other military forces. During peacetime the NMCB trains for this mission by undertaking construction projects at overseas bases. There are currently eight Battalions, homeported in either Gulfport, Mississippi or Port Hueneme, California. These Battalions deploy overseas on a rotating basis for approximately seven months at a time. A deployment schedule exists such that each NMCB is relieved by a successor NMCB at the end of the deployment period. This assures that incomplete construction projects are properly passed on for completion by the follow-on Battalion. Prior to deploying, the Battalion receives its preliminary construction tasking from the NCB responsible for the area in which it will deploy. (NAVFAC P-315 1985).

A Battalion operates much like a construction company and is responsible for the planning and execution of each construction project. This responsibility includes the management of personnel, equipment, tools and materials, safety, control of methods employed, coordination of engineering support and quality control. Upon deployment, the NMCB establishes a base of operations at one of four major Naval installations known as mainbody sites. These sites are presently designated as

Okinawa, Japan; Rota, Spain; Roosevelt Roads, Puerto Rico and Guam. The Battalion may be tasked by the NCB to complete projects in locations other than the mainbody site. In which case, details would be sent out from the Battalion's mainbody. These details remain under the control of the NMCB commanding officer. The bulk of the Battalion's personnel are normally at the mainbody site. The survey undertaken for this report investigates the availability factor for an NMCB mainbody deployed to Okinawa, Japan.

## 2.2 How A Battalion is Tasked.

The 3rd NCB determines the work load for NMCB's deploying to Okinawa by matching the total estimated man-days of the projects to be tasked to the direct labor man-day capability of the Battalion mainbody. The following formula is used to determine the man-day capability of the Battalion mainbody:

$$MC = DL \times WD \times ME \times AF$$

where: MC is the total man-day capability  
 DL is the number of direct labor personnel assigned  
 WD is the number of available workdays  
 ME is the man-day equivalent (converts an eight hour day to the actual length of the work day, usually nine hours,  $9/8 = 1.125$ )  
 AF is the availability factor

In calculating the available work days, the following are excluded: Sundays and non-work Saturdays, holidays, time for turnover between Battalions, one day for a mid-deployment party and, when necessary,

one day for a change of command. (CBPAC/CBLANTINST 5200.2A 1991b; CECOS 1993).

A portion of the total man-day capability must be allocated to training evolutions which take place throughout the deployment. This training may include Physical Fitness Training, General Military Training, Rapid Runway Repair Training, Field Exercises and Combat Skills Training. In order to establish the number of man-days available for project accomplishment, the training allocation must be subtracted from the total man-day capability. (CBPAC/CBLANTINST 5200.2A 1991b).

Once the man-day capability for project accomplishment has been determined, projects are tasked until the total estimated man-days to complete the projects approximately equals the man-day capability. After the NMCB has been deployed for 45 days, a review of the tasking is completed and the tasking is revised to account for the projected completion of projects in progress and any revised project priorities. (CBPAC/CBLANTINST 5200.2A 1991b).

Upon being tasked, the NMCB plans each individual project and develops a construction schedule to accomplish their tasking. Normally, a Battalion works a rotation of a six-day week followed by a five day week. Approximately half of the scheduled Saturdays are for work on the projects, while the other half are used for training. The workday is ten hours in duration, which includes nine hours of direct labor and one hour for lunch. The ten hour duration is meant to start at the job site and end at the job site. (CBPAC/CBLANTINST 5200.2A 1991b).

## **Chapter 3**

### **Methodology**

#### **3.1 Data Gathering.**

To conduct this study, it was necessary to develop an availability factor based upon input from the direct labor personnel of a currently deployed Battalion and the Battalion's internal records. Two questionnaires were developed and used to gather the required study data.

##### **3.1.1 Direct Labor Questionnaire.**

The Direct Labor Questionnaire, contained in Appendix A, targeted specific activities which may take place during a direct labor Seabee's workday and the time associated with his participation in these activities. The questionnaire relied upon the knowledge and perceptions of the direct labor personnel who completed it and was the primary source of data used to generate the current availability factor.

##### **3.1.2 Operations Officer Questionnaire.**

The Operations Officer Questionnaire, contained in Appendix B, was completed by the Battalion's Operations Department and generated data based upon records kept by various departments within the Battalion. The questionnaire was necessary to produce relevant data not readily accessible from questioning a direct labor individual and to provide an understanding of the policies under which the Battalion operates. Examples of data which

were not available from direct labor individuals are the total number of direct labor man-days lost due to accidents during a month and the number of direct labor personnel currently in the brig. The questionnaire was also designed to provide overlapping data with the Direct Labor Questionnaire. This allowed the author the opportunity to compare the data and judge the validity of the responses from the direct labor personnel.

### 3.1.3 Questionnaire Scopes.

The questionnaires were completed by a Battalion at the end of their fifth month of deployment to Okinawa. The author coordinated with the Battalion's Operations Department to have the Direct Labor Questionnaire administered on site and was not in Okinawa during this study. Acceptable responses were gathered from 59.8% of the Battalion's direct labor personnel (64 out of a possible 107). Personnel from all projects being worked on by the Battalion were included in the survey, as were direct labor individuals from all level of project organizations. Tables 3.1 and 3.2 illustrate the breakdown of responses with respect to project and crew position. The "Frequency" column in the Tables represent the number of questionnaire responses corresponding to each respondent's project and crew position. The "Percent" column represents the percent of the total number of responses for each project or crew position. An effort was made to include as many crew leaders in the questionnaire pool as possible, as they have the most direct access to information about their entire crew's activities. The number of crew leader responses shown in Table 3.2 exceeds the number of



projects for two reasons. Project JK9-826, Construct Pass and ID Building, is a large project with more than one crew working at the same time. Additionally, Bravo Company Maintenance and CO Discretionary Projects are headings which include numerous repair and minor construction projects, each of which may have a separate crew leader.

**Table 3.1. Questionnaire Project Distribution**

Project Name	Frequency	Percent
JK2-855 Haz Mat Storage	5	7.8
JK3-308 Camp Maintenance	19	29.7
JK3-500 CO Discretionary	15	23.4
JK9-826 Pass & ID Office	23	39.1
Total	64	100.0

**Table 3.2. Questionnaire Crew Position Distribution**

Position on Crew	Frequency	Percent	Valid Percent
Project Supervisor	6	9.4	9.5
Crew Leader	16	25.0	25.4
Crew Member	41	64.1	65.1
Missing	1	1.6	
Total	64	100.0	100.0
Valid Cases	63		
		Missing Cases	1

### 3.2 Data Analysis

Data from both questionnaires were used to develop a single availability factor for the Battalion's mainbody for the month preceding the survey. This availability factor will be the basis against which the availability factors calculated from NMCB man-day expenditure data are compared.

### 3.2.1 Direct Labor Questionnaire.

The raw data collected from the Direct Labor Questionnaire were utilized to generate the amount of time, on average, that each direct labor individual expended each day on the following lost time activities:

Medical Visits	Payday
Dental Visits	Personal Time
Admin/Personnel Visits	Watch Sleep-in
Collateral Duties	Duty
Leave	Special Liberty
Accidents	

The software SPSS® for Windows™ was used to compile a data base from the raw data. The data were then explored to identify extreme and erroneous values. This was accomplished in two separate steps. First, stem-and-leaf plots, an example of which are presented in Figure 3.1, were constructed for each questionnaire variable. (Note: Each question on the questionnaire represents a separate variable and the sum of an individuals responses to all of the questions is considered a case.) These plots display the range of data for a particular variable much like a histogram. From the plots, extreme values are readily identifiable. In the example shown, the extreme values identified (58500, 63000, and 63900) are shown in seconds and are the equivalent to the following times: 1415, 1730, and, 1745. Once identified, the extreme data points were checked against the original questionnaire responses and then against the corresponding values given by members of the same crew. The author, based upon his experience, then made a decision whether or not to delete the data points. Only the extreme

data points were deleted, not the entire case. In all, four out of a possible 1545 data points were deleted as extreme values.

ENDDAY	TIME CREW DEPARTS	JOBSITE
Frequency	Stem &	Leaf
2.00	Extremes	(58500)
10.00	59 *	4444444444
1.00	59 .	8
10.00	60 *	0333333333
2.00	60 .	99
27.00	61 *	0222222222222222222222222222
1.00	61 .	5
7.00	62 *	1111111
4.00	Extremes	(63000), (63900)
Stem width: 1000 Each leaf: 1 case(s)		
Note: All times shown in seconds.		

Figure 3.1 Sample Stem-and-Leaf Plot

Secondly, erroneous data were identified by cross checking data points within an individual case. For example, the time an individual reported he left the job site to assume duty at the end of a workday was compared to the time that same individual reported he left the job site at the end of the day on a regular basis. If the time he reported leaving on a duty day was later than on a non-duty day, the information was considered erroneous and the data point was deleted. Similar comparisons were made for the time an individual arrived at the job site the morning after a duty day and for the length of lunch break as compared to the end of the normal work day.

From this purged data base, information detailing the time associated

with each lost time category was extracted. The survey provided this information in varying forms, largely due to the author's attempt to ease the burden on the individual completing the questionnaire and to the fact that the information naturally lends itself to different time frames. For example, the individual was asked about the amount of time he spent on medical visits during the past week, but when asked about the amount of time he was granted for special liberty, the time frame is the past month. This is because the individual is more likely to visit Medical during any one week than he is to be granted special liberty during that week. Thus, a larger time frame is required to gather adequate information about special liberty time. The factors used to reduce the data to a standard basis (time/man/day) are as follows:

107	average number of total direct labor personnel during the month prior to the survey
22	number of workdays in the month prior to the survey
5	number of workdays in the week prior to the survey (the survey was completed on a Training Saturday)

These same factors were also used in reducing data from the Operations Officer Questionnaire.

### 3.2.2 Operations Officer Questionnaire.

The Operations Officer Questionnaire provided the primary data for four lost time categories: Military Gear Issue, Disciplinary Actions, Indoctrination/Transfer and No Duty Due to Illness. The questionnaire also provided comparison information for four other categories: Accidents, Medical Visits, Dental Visits and Leave. As with the Direct Labor Questionnaire, the

data from this questionnaire were reduce to a time/man/day basis.

### **3.2.3 Data Comparison and Summation.**

A comparison between the data produced from the overlapping categories of each questionnaire was then carried out. As the intent of this study was to develop an availability factor based upon individual direct labor input, the Direct Labor Questionnaire data was utilized unless it could be determined, to the author's satisfaction, that the Operations Officer Questionnaire provided more accurate data.

Finally, the reduced activity times for each lost time category were summed. Using a nine hour workday (540 minutes) as a quotient, the amount of time a direct labor individual spends on activities other than direct labor is expressed as a percentage. The complement of this percentage is the availability factor.

### **3.3 Availability Factor Comparison.**

The last step in this study was to compare this "grass roots" availability factor with: (1) an availability factor calculated for the month prior to the survey from man-day expenditure data; (2) an average availability factor based on all months the surveyed Battalion was deployed to date; and (3) an average availability factor from a Battalion previously deployed to Okinawa. The comparison of the "grass roots" availability factor and the one calculated using man-day data for the month prior to the survey should be favorable as they are both derived from information essentially from the same time period.

The other comparisons are more broad based as they illustrate the relationship of an availability factor based on a one month period with an average factor over several months and an entire deployment.

## **CHAPTER 4**

### **Presentation and Analysis of Data**

Three primary types of data were collected and analyzed in this study: data concerning Battalion policy; numerical data required for the calculation of an availability factor from the Direct Labor and Operations Officer Questionnaires; and data detailing availability factors calculated from NMCB man-day expenditure records.

#### **4.1 Battalion Policy.**

As explained earlier, the Battalion has a certain amount of autonomy and is responsible for developing, within NCB guidelines, the specific policies which govern the way in which the Battalion operates on a daily basis. In order to better understand the data, and be able to correlate it to any other deployed Battalion, it is necessary to investigate the policies of the Battalion from which the data in this report was extracted. A summary of the policies governing activities which may cause a loss of availability is presented with the questionnaire results.

##### **4.1.1 Quarters.**

The Battalion holds morning muster, or quarters, at 0540 on Monday, Wednesday and Friday and physical training (PT) follows until approximately 0630. To allow personnel time for showers and breakfast, the workday does not commence until 0730. On Tuesday, Thursday and work Saturdays,

quarters are held at 0630 and last until approximately 0650. The workday commences at 0700. As quarters are held outside of normal working hours, there is no lost time associated with them. By ascertaining the average time personnel arrive on the project site each morning, the questionnaire attempted to reveal any reoccurring delay in quarters which would cause lost direct labor time. The data reveals that on PT days the average arrival time of direct labor personnel is 0747 and on non-PT days is 0725. Assuming a five-day workweek, an average of twenty minutes is lost each day prior to the commencement of the workday. This time is likely to be attributable to travel, as the majority of the project sites during the Battalion's deployment are not in close proximity to the Seabee Camp (Honkomp 1993a). As discussed in Chapter 2, travel time is considered direct labor (CBPAC/CBLANTINST 5312.1A 1990) and therefore, no lost time need be accounted for by the availability factor.

#### 4.1.2 Uniform Inspections.

Working uniform personnel inspections are held by the Battalion at quarters every Thursday. Quarters commence at 0630 and the inspection is concluded by approximately 0650, prior to the start of the workday. No dress uniform inspections will be held during the Battalion's deployment. Inspections, therefore, account for no lost direct labor time.

#### 4.1.3 Duty/ Watches.

The Battalion stands a five section watch. This means that, on



average, each Seabee will stand duty six times a month. (Honkomp 1993a). Watches falling on workdays will normally require the watch standers to depart the job site early to prepare to assume the watch. The questionnaire revealed that, on average, personnel departed the job site at 1638 on duty days. Late watches on days preceding workdays may require the watch standers to sleep-in and report to the project site at a later time than usual. Depending on the watch, sleep-in lasts until 0900 or 1200.

#### **4.1.4 Collateral Duties.**

Duties, in addition to those defined as direct project labor, are a necessary part of the administration and functioning of the Battalion. These collateral duties, which amount to a loss of direct labor if a direct labor person must leave the project site to perform them, can include such things as being a safety representative, a member of the Morale, Welfare And Recreation Board, or a member of the Menu Review Board. Collateral duties affect both senior and junior personnel. The results of the questionnaire indicate that approximately 19% of the direct labor personnel were assigned collateral duties and lost approximately 3.5 hours a week attending to them. While at first glance this may appear to be too large an amount of time, the survey's inclusion of a large number of project superintendents and crew leaders, who are necessarily involved with off-site project management concerns, makes this length of time reasonable.

#### **4.1.5 Medical Visits.**

While deployed, the Battalion operates its own medical clinic and provides primary care for its personnel. The Battalion's Medical Department utilizes a medical readiness program and attempts to reduce the impact on the workday by coordinating checkups and required physical exams during Training Saturdays. (Honkomp 1993a). Just less than eight per cent of those surveyed acknowledged visiting medical in the week prior to the survey and the average time away from the job site for these visits was 68 minutes. The Operations Officer Questionnaire data provided a time/man/day value within 0.1 min/man/day of the value produced from the Direct Labor Questionnaire for this category.

#### **4.1.6 Dental Visits.**

The Battalion also operates its own dental clinic while deployed. Approximately fourteen percent of those surveyed were seen at dental in the month preceding the survey and reported their average time away from the job site for each visit to be approximately 51 minutes. The Operations Officer Questionnaire data provided a time/man/day value which was essentially equal to the min/man/day value of the Direct Labor Questionnaire for this category.

#### **4.1.7 Admin/Legal Visits.**

Just as with the Medical and Dental functions, the Battalion provides administrative, disbursing, and legal services to its members. The breadth of these services is quite extensive. Of those surveyed, seventeen per cent

reported utilizing these services in the week prior to the survey and reported an average time of 75 minutes away from the job site for a single visit.

#### **4.1.8 Leave.**

The Battalion's leave policy permits two weeks in-theater leave for most personnel. Detail Officers-in-Charge are not normally granted leave. This policy should not be taken to mean that all other personnel take two weeks leave. In fact, a negative response was received from all questionnaire participants indicating that none had taken leave within the previous month. The Operations questionnaire also indicated that no direct labor personnel were on leave at the time of the survey.

#### **4.1.9 Special Liberty.**

Special Liberty is normally granted as a reward for such endeavors as re-enlisting or completing a high priority project. The Battalion gives each re-enlisted member one 72-hour and one 24-hour special liberty. The survey indicated that approximately 11% of those surveyed had been granted a day of special liberty during the previous month.

#### **4.1.10 Personal Time.**

Personal time is intended to include any time off during normal working hours, other than leave or special liberty, granted to take care of personal needs. Examples include time for getting a haircut or going to the exchange. This discretionary time is normally granted at the crew level.

Approximately 30% of those surveyed reported being given, on average, an hour to attend to personal business during the week preceding the completion of the survey.

#### 4.1.11 Paydays.

The Battalion's policy on paydays is to allow, when possible, an extra half hour during the lunch break. This gives personnel time to cash checks and purchase money orders. The granting of this time appears to be at the discretion of the project leadership. Additionally, a shuttle bus runs on paydays to Camp Foster for those personnel who need to conduct business at the Navy Federal Credit Union. The round trip time for this run is two hours. Survey responses ranged from receiving no extra time on pay days to getting 1.5 hours.

#### 4.1.12 Safety Mishaps/ Accidents.

Construction is one of the most dangerous industries in the world and even with the intense safety programs instituted by Battalions, accidents do happen. Accidents, both on and off the project, may result in injuries which render a Seabee unable to work. When this occurs, there is lost time. This is the only category where the author chose to use data from the Operations Questionnaire in lieu of data from the Direct Labor Questionnaire. The Direct Labor Questionnaire yielded a time/man/day figure equivalent to having approximately two personnel lost each day due to accidents. The data was skewed primarily due to the fact that one individual surveyed had been

injured and lost five days of work in the week preceding the survey. Additionally, only two other individuals reported any lost time associated with accidents and neither of these were substantiated by the responses of other members of their crews. The value of eight lost man-days for the month, provided by the Operations Officer Questionnaire, was checked against the average number of lost man-days per month during the Battalion's deployment (Honkomp 1993b) and also against the monthly average for two Battalions previously deployed to Okinawa (NMCB-5 DCR 1992; NMCB-7 DCR 1993). This value was consistent with both averages. A summary of lost man-days related to accidents for all three battalions is provided in Appendix C.

#### 4.1.13 Transferring Personnel.

Throughout a deployment, personnel continue to transfer in and out of the Battalion. Those personnel due to transfer out of the Battalion are usually assigned to the main body for ease of administration. This creates a fairly large turnover of personnel at the main body site. During the turnover process, direct labor is lost as incoming personnel must go through the administrative process associated with checking onboard and as outgoing personnel are released from their direct labor duties to check-out. The Battalion allows two days for a Seabee to either check-in or check-out. The Battalion reported nine personnel transferring in and five personnel transferring out during the month prior to the survey.

#### **4.1.14 Indoctrination Program.**

When a new Seabee checks into the Battalion he attends an indoctrination program to familiarize him with the organization and operation of the Battalion. While longer during homeport, this program is completed in one day during deployment.

#### **4.1.15 Military Gear Issue.**

Each mainbody deployment site is equipped with a full NMCB Table of Allowance of military gear. At the beginning of the deployment, each Seabee is issued a set of personal infantry gear, commonly referred to as 782 gear. The Battalion completed this activity during normal working hours, thus losing direct labor time. The time for each man to receive his issue was only fifteen minutes, a minuscule amount of time when compared to the entire deployment.

#### **4.1.16 Disciplinary Actions.**

Given human nature and the high professional standards set by the Navy, disciplinary actions are sometimes necessary. One such action is to impose restriction on an individual only during liberty time. This allows the restricted individual to carry out his normal duties during the workday. When more severe punishment is necessary, an individual may be restricted without duty or placed in the brig. If either of these occurs, there is obviously lost time on the project site. The Battalion reported four direct labor personnel in this status on the questionnaire response and again in a verbal

interview the following month (Honkomp 1993a). Though this value seems excessive, it is likely to be a representation of the lost time of all Battalion direct labor personnel. Most Battalions have a policy of removing individuals with major disciplinary problems from detail sites and placing them at the mainbody. Thus, the majority of lost time associated with this category occurs at the mainbody site.

#### **4.1.17 No Duty Due To Illness.**

This category is intended to account for those direct labor personnel who are unable to work or who are on light duty due to illness or injury. The Operations Officer Questionnaire reported six direct labor personnel, the equivalent of 6.75 man-days each day, in a no duty status due to illness.

#### **4.1.18 Category Overlap.**

One area of possible concern with the use of the above categories arises from a possible overlap in categories. Because the "No Duty Due to Illness" category accounts for personnel who are injured, it is expected to account for the majority of personnel who lose time when assigned to light duty. A drawback of defining the category in this way however, is that the time it accounts for may also overlap with the "Safety Mishaps/ Accidents" category. The "Safety Mishaps/ Accidents" category does not cover light duty days, but does cover lost time days due to accidents. Because there was no other way to account for lost time due to light duty and the Safety Mishaps/Accidents value is relatively small, neither category was deleted

from the tabulations. A complete overlap of the two categories would raise the availability factor by only 0.3%.

#### **4.2 A Grass Roots Availability Factor.**

From the Direct Labor Questionnaire responses, the raw data base contained in Appendix D was generated. Of the responses received, only two were completely eliminated from this data base, one due to completion by a non-direct labor individual and one due to insufficient information as a whole. A total of 64 responses were included in this data base. If an answer on the questionnaire response was insufficient or ambiguous, only that data point was deleted from the raw data base. As discussed in Chapter 3, the raw data base was analyzed and extreme and extraneous data points were deleted. A total of eleven data points were deleted in this process. The "purged" data base is contained in Appendix E.

This "purged" data base, along with responses obtained from the Operations Officer Questionnaire and follow-up telephone discussions with the Battalion's Operations Officer, was utilized to calculate the lost time associated with each activity accounted for in an availability factor. The results, shown in Table 4.1, indicate that a direct labor Seabee is not available on the job site 85 minutes out of a possible 540, or 15.7% of the time, on any given day. This relates to an availability factor of 84.3%.

The lost time activities are displayed in Figure 4.1 as a percentage of the total amount of lost time. It is seen from the figure that the activities which account for the most lost time during the workday are "No Duty Due To



Table 4.1. Lost Time Activity Analysis

Activity	Min/Man/Day	Percent of Total Lost Time
Quarters	0.0	0.0
Inspections	0.0	0.0
Duty/Watches	11.2	13.1
Collateral Duties	8.1	9.5
Medical Visits	1.3	1.5
Dental Visits	0.5	0.6
Admin/Legal Visits	4.1	4.8
Leave	0.0	0.0
Special Liberty	2.7	3.2
Personal Time	3.4	4.0
Paydays	1.7	2.0
Safety Mishaps/Accidents	1.6	1.9
Transferring Personnel	6.4	7.5
Indoctrination Program	2.1	2.5
Military Gear Issue	0.1	0.1
Disciplinary Actions	16.8	19.7
No Duty Due To Illness	25.2	29.6
Total Lost Time	85.2	100.0
Availability Factor	84.3%	

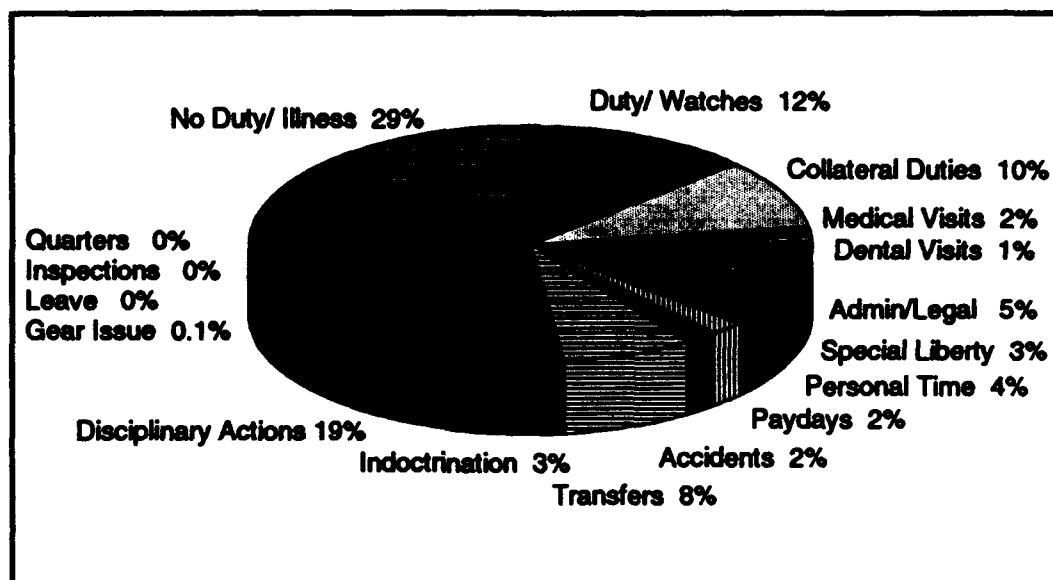


Figure 4.1 Lost Time Activity Distribution

Illness" (29.6%), "Disciplinary Actions" (19.7%) and "Duty/Watches" (13.2%). Combined these activities account for over 60% of the lost availability during a day.

#### 4.3 Survey Battalion Man-Day Expenditure Data.

Man-day expenditure data were obtained from the survey Battalion's Operation Officer (Honkomp 1993b). Availability factors for each month of deployment were calculated from this data using the following formula:

$$\text{Availability Factor} = \text{MDE} / (\text{DL} * \text{WD} * \text{ME})$$

where: MDE is the actual number of direct labor man-days expended on projects during a month  
DL is the average number of direct labor personnel  
WD is the actual number of workdays  
ME is the man-day equivalent equal to 1.125

This formula is derived by rearranging the formula for calculating man-day capability described in Chapter 2. The data and availability factors are shown in Table 4.2. The average availability factor for the Battalion over the five month period shown in Table 4.2 is 77.3%.

**Table 4.2. Survey Battalion Availability Data**

	March	April	June	July	August
Total DL Man-days	803	2387	2223	1970	2714
Training DL Man-days *	74	521	188	174	196
Project DL Man-days	729	1866	2035	1796	2518
No. of DL Personnel	92	90	97	93	101
Actual Workdays	13	24	23	22	23
Availability Factor	54.2%	76.8%	81.1%	78.8%	96.4%
Average Availability Factor	77.3%				
*Estimated based on SITREP's, PT, and Training Saturdays for each month.					

#### 4.4 Previous Battalion Man-day Expenditure Data.

Every Battalion is required to submit man-day expenditure data to the NCB at the completion of their deployment. These data are contained in a Deployment Completion Report (DCR). The DCR also requires the Battalion to calculate an "efficiency" using these data. The prescribed formula for calculating the efficiency, as provided in CBPAC/CBLANTINST 3121.1B (1991a), is:

$$\text{Efficiency} = \text{Actual DL man-days expended} / (\# \text{ DL} * \# \text{ Workdays} * 1.125)$$

From Section 4.3 above, the formula for calculating the availability factor is:

$$\text{Availability Factor} = \text{MDE} / (\text{DL} * \text{WD} * \text{ME})$$

where ME is usually 1.125

At first glance it would appear that the two formulas are virtually interchangeable and that the efficiency factor is the same as an availability factor based on actual man-day expenditure data. This is not always true, primarily due to a lack of specific guidance concerning certain elements of the efficiency formula. First, when calculating efficiency, the value used for "actual DL man-days expended" may include direct labor training man-days, especially those expended during field exercises, and man-days expended by mainbody direct labor personnel during contingency operations at locations other than the mainbody site. These man-days may be included in addition to direct labor man-days expended on normal project work (NMCB-5 DCR 1992). An availability factor should be derived using only direct labor

man-days expended on projects at the site for which the factor is being calculated. Secondly, the number of actual workdays reported and used in the efficiency calculation does not normally include training Saturdays, but may include days of field exercises and other major training evolutions. No training days should be included in the calculation of an availability factor. Finally, no guidance is provided to specifically detail how to calculate the number of direct labor personnel actually assigned (CBPAC/CBLANTINST 3121.1B 1991a). The value used in the efficiency calculation could be the average for the month or the number at the end of the month. All of the above variables are left to the interpretation of the individual creating the report.

Because of the vast amount of room left for interpretation in calculating the efficiency and a lack of exact direct labor personnel data, it was difficult to develop availability factors for previous Battalions from their DCR's. Table 4.3 includes excerpted data from the NMCB FIVE's DCR when they were deployed to Okinawa from January to July 1992, roughly the same deployment time frame as the survey Battalion during the previous year. The month of March is excluded from the Table, as a field exercise was held during the month. By back-calculating the number of direct labor personnel for each month and comparing these to the Executive Summary and Personnel Summary in the DCR, the author believes that the efficiency factors shown were calculated using only direct labor project man-days. If only direct labor project man-days were used in the efficiency calculations, it follows from the discussion above that the efficiency values are

approximately equal to availability factors for each month. Thus, Table 4.3 labels these values as "Efficiency/Availability."

**Table 4.3. Previous Battalion Availability Data**

	JAN	FEB	APR	MAY	JUN	JUL
Project DL Man-days	880	1299	1932	1475	1805	1182
Training DL Man-days	101	346	319	633	662	375
No. DL Personnel	93	77	89	72	77	68
Actual Workdays	14	22	24	22	24	24
Efficiency/Availability	60%	68%	80%	83%	87%	64%
Avg. Efficiency/Availability	74%					

#### 4.5 Data Comparison.

A summation of the availability factors, both calculated from the questionnaire data and various man-day expenditure data, is presented in Table 4.4. The Table also shows the differences between the availability factor developed from the questionnaires and the other factors which are based upon reported man-day expenditures.

**Table 4.4. Comparison of Availability Factors**

Availability Factors Derived From:	Availability Factor	Difference
Questionnaire Data	84.3%	
Survey NMCB Man-day Expenditures for the Month Prior to the Survey (July)	78.0%	-6.3%
Survey NMCB Man-day Expenditure Data Average Monthly Value	77.2%	-7.1%
Previous NMCB Man-day Expenditure Data Average Monthly Value	74.0%	-10.3%

The most significant comparison can be made between the questionnaire data value and the value calculated from the survey Battalion's

man-day expenditure data for the month preceding the survey. Both values fall within the estimated range of 75% to 85%, but the difference between the two values is 6.3%. This translates to a difference of roughly 34 minutes per man per day of lost direct labor time or approximately 900 man-days over the course of the Battalion's deployment. The author has developed three possible explanations for this wide disparity.

First, the number of direct labor training man-days for each month was not available at the time of this survey. The author, as noted in Table 4.2, estimated the number of training man-days based upon the Physical Training days and Training Saturdays listed on the Battalion's deployment calendar (NMCB-74 45 Day Review Final 1993). The training estimate was then validated by the information contained in the Battalion's Monthly Situation Reports (NMCB-74 SITREPS 1993). Although the SITREP's do not give the number of man-days expended on training, they do provide comments about what training was performed during the month. An estimate error of twenty-three training man-days will yield a one percent difference in the resulting availability factor.

Secondly, and probably of greater consequence, is the result of the disparity in the number of the direct labor personnel provided by the Operations Officer Questionnaire response (107), and in the Battalion's man-day expenditure data (93). Though the reason for this disparity is unclear, the impact is readily quantifiable. An availability factor was recomputed using the survey data and a direct labor value of 93. As most of the lost time categories did not rely on this number for tabulation, only five, those

**Table 4.5. Revised Lost Time Activity Analysis**

<b>Activity</b>	<b>Min/Man/Day</b>	<b>Percent of Total Lost Time</b>
Quarters	0.0	0.0
Inspections	0.0	0.0
Duty/Watches	11.2	13.1
Collateral Duties	8.1	9.5
Medical Visits	1.3	1.5
Dental Visits	0.5	0.6
Admin/Legal Visits	4.1	4.8
Leave	0.0	0.0
Special Liberty	2.7	3.2
Personal Time	3.4	4.0
Paydays	1.7	2.0
Safety Mishaps/Accidents	1.9	2.0
Transferring Personnel	7.4	7.9
Indoctrination Program	2.4	2.6
Military Gear Issue	0.1	0.1
Disciplinary Actions	19.4	20.8
No Duty Due To Illness	29.0	31.1
<b>Total Lost Time</b>	<b>93.2</b>	<b>100.0</b>
<b>Availability Factor</b>	<b>82.7%</b>	

resulting from the Operation's Officer Questionnaire, had to be revised. Table 4.5 presents the revised data and shows a recomputed availability factor of 82.7%. The difference now is 4.7%, representing approximately twenty-five minutes of lost time per man per day. This is still a considerable difference between the two values.

Finally, the questionnaire data value was expected to be greater than the man-day expenditure data value because the survey data will account only for those activities specifically targeted. Lost time due to untargeted activities, which are often short in duration or occur sporadically, will add up over the course of a deployment. Visits to the chaplain, counseling sessions

or attendance at Captain's Mast as a witness are all activities which may possibly render a direct labor individual unavailable at the job site during working hours. While the author attempted to target those activities which would account for the greatest losses of availability, not all such activities could be reasonably foreseen or included in the questionnaire.

A comparison of the questionnaire value and the average monthly value for the survey Battalion's deployment thus far, reveals both to be within the established range. The average man-day expenditure value is expected to be lower due to untargeted lost time activities and because there was no leave during the month of the survey. During the course of deployment, leave will surely occur, if only due to emergency situations. Evaluations of these two values for other than a cursory look yields little information, as the survey provides a "snap shot" and does not account for the many variables which affect a Battalion over the entire deployment.

The greatest difference in values occurs between the survey value and the average monthly value for a Battalion previously deployed to Okinawa. This difference may largely be the result of the author's assumptions stated in Section 4.4 above. Inaccuracy in estimating the number of direct labor personnel assigned each month would have a large effect on the resulting availability factors. It should be noted that the average value of 74% is not within the 75% to 85% range normally used as a availability factor. This discrepancy is mentioned not to bolster the argument that this value is incorrect, but merely to point out that the deployment for this Battalion may have included activities leading to lower than usual availability factor.



## **CHAPTER 5**

### **Conclusions and Recommendations**

#### **5.1 Conclusions.**

Though the availability factor derived from questionnaire data cannot conclusively verify the accuracy of a man-day expenditure derived factor for a given month, the results of this study serve to validate the accepted range of 75% to 85% for availability factors for the Okinawa mainbody deployment site. All of the availability factors developed or collected during the course of this study, with the exception of one at 74%, fell into the range. Given a choice in the tasking process, a Battalion is likely to choose an availability factor at the lower end of the range. The lower availability factor would lessen the Battalion's tasking and ease some of the strain on project management caused by the many unforeseen challenges which typically arise during a deployment. What specific availability factor should the Brigade use then in its man-day capability calculations? An overzealous value will cause the Battalion to be over tasked and could lead to difficulties as the Battalion puts forth its greatest "Can Do" effort towards an unattainable goal. If too low an availability factor is used, the Battalion will be under tasked and may lose precious homeport preplanning time as they struggle to coordinate a project tasked at the 45 Day Review or even later in the deployment. As stated in most of the Navy guidance on the subject, a historically based, average value may best serve the purpose. Currently, however, no system is in place to accurately gather and record the necessary

data.

The difficulties encountered by the author in trying to ascertain accurate availability factors from the records of previous Battalions were numerous. Recent changes to the SITREP format deleted such reporting requirements as the number of direct labor man-days expended per project per month and the number of actual work days in each month (CBPAC/CBLANTINST 5200.2A 1991b). As pointed out in Chapter 4, Deployment Completion Reports (DCR's) are the easiest place to record availability factors. The current DCR guidance however fails to call for this and instead asks for an "efficiency factor" (CBPAC/CBLANTINST 3121.1B 1991a).

Even with a data collection system in place, the definition of what an availability factor accounts for and how availability affects a Battalion are concepts which are often misunderstood. Present Navy guidance does little to clear up these misunderstandings.

The calculation of an availability factor based upon direct labor input undertaken by this study reveals a host of information about a Battalion's activities. The author does not recommend that such a method be used on a regular basis to develop realistic availability information. The author does, however, see merit in the use of short questionnaires administered on Training Saturdays to evaluate the extent and impact of certain lost time activities. One thing that should be taken from the data in this survey is an indication of activities, such as illness, disciplinary actions, watches and collateral duties, which remove large amounts of time from direct labor.

Armed with this information, the Operations Officer can develop a plan of action to mitigate the impact of these activities and increase availability.

## 5.2 Recommendations.

The following are recommendations developed in the course of this study which should increase the validity of availability factors and the effectiveness of using them:

(1) It is imperative that all applicable Navy instructions, manuals and teaching guides be coordinated to provide the same definition and explanation of the availability factor and its use. Contradictions, such as whether or not travel time is accounted for by the factor, must be resolved. Consistency throughout all the guidance is vital to an adequate understanding of the availability factor. To ensure NCF-wide consistency, resolution of an acceptable definition and explanation should be accomplished through interaction between both NCB's and the Civil Engineer Corps Officer School. Input from Battalion Operations Officers should be included in the resolution process.

The author recommends accounting for travel time in the availability factor and no longer considering it direct labor. The development and use of an average availability factor over a period of three or more deployments should account for minor fluctuations in travel time. The NCB area coordinator should have enough knowledge of the project locations during the tasking process to adjust the average factor up or down slightly to

account for extremes in the locations of projects with respect to the Seabee Camps. Reclassifying travel as non-direct labor is logical as travel is not an activity which directly results in work-in-place. This approach does however have one drawback. The present timekeeping procedures call for recording activities to the nearest man-hour. This would have to be changed to record activities, such as travel, which have durations shorter than one hour.

2) Personnel at the NCB level on down need to be educated on the use of the availability factor and its meaning. This is being done more and more in the CECOS Seabee Construction Management course, but wider understanding is needed. Used correctly, the availability factor can be an effective construction management tool at the project level (CECOS 1992).

(3) The efficiency factor presently required to be provided in each Battalion DCR should be changed to an availability factor. If for some reason this efficiency factor is needed, an availability factor should also be required by the report. In either case, specific guidance should be given explaining how each variable in the equation is to be determined. Recommended guidance includes:

(a) Only direct labor man-days expended on project work need to be included in the calculations. No training man-days, including those expended during field exercises, should be used in the calculation of the availability factor.

(b) Direct labor man-days expended during periods of contingency operations, such as disaster recovery, should only be included in the availability factor calculation if they occur at the site for which the

factor is being calculated. The inclusion of contingency operations will most likely inflate the availability factor, as direct labor activities during these periods normally take precedence over daily routine. The type and duration of the operations should be noted in a comments section to provide an explanation for variations in the calculated availability factor caused by the operations.

(c) The average number of direct labor personnel assigned should be calculated from the sum of the number assigned each workday, divided by the number of actual workdays. This will yield a true average. It must be stressed that direct labor personnel in the hospital, on leave, or at other places which result in extended absence from the job site, are still considered assigned direct labor. Furthermore, personnel not normally assigned as direct labor who are performing direct labor work, are to be included as direct labor assigned. Failure to do so will falsely inflate the availability factor.

(d) The number of actual workdays must include only those spent on project work and contingency operations. No training days, including field exercises, should be included.

(4) The NCB should stress the requirement for accurate reporting of availability factors and develop a historical data base of the factors for each deployment site. From this data base, a true site-specific historical average can be calculated and used in Battalion tasking. These site-specific availability factors should be provided to the Battalions along with their preliminary deployment tasking.

(5) The monthly SITREP format should be revised to include the number of man-days expended per project, the number of workdays each month and the average number of direct labor assigned. This will enable the Brigade to verify the availability factors reported in the DCR's and will provide the necessary information to investigate fluctuations in the reported availability factors. Additionally, a homeported Battalion can readily use the data to calculate current availability factors for their upcoming deployment sites.

For easy reference, the problems identified in the NCF's current system relating to availability factors and the recommended solutions to these problems, as detailed above, are summarized in Table F.1 of Appendix F.

### 5.3 Additional Observations.

During the course this study, certain observations were made which, though not specifically related to availability, are worthy of mention:

(1) The Operations Officer's Handbook (CBPAC/CBLANTINST 5200.2A 1991b), defines travel as a direct labor activity, yet goes on to state that the nine-hour workday starts and ends at the job site. This is somewhat contradictory in that travel time to and from the job at the beginning and end of the day, would be direct labor performed outside of the normal workday. Based upon the survey data, travel, in the morning especially, accounts for a

significant portion of the nine-hour workday. Clarification of the NCB's expectations may be required.

(2) The survey data reveal that travel, breaks with the exclusion of lunch, and job site safety lectures, when combined can account for nearly one hour of each workday. All are necessary and all are usually considered direct labor. The question arises as to how a Seabee accounts for these activities in the project planning process. The author could find no mention of planning for breaks and safety lectures in the Seabee planning and estimating guidance. The guidance specifically states that travel time is not accounted for in the labor estimating tables it provides. (NAVFAC P-405 1989). If a Seabee fails to allocate time for these activities in the planning process, he will register them as direct labor man-days against the project, yet not actually be performing any work. This area should be investigated further.

(3) The safety summary provided in Appendix C presents a startling occurrence. During the sixth month of their deployment, each Battalion experienced an increase in the number of lost time due to accidents. In each case the lost time for the sixth month was in excess of twice the monthly average for the deployment. Trends such as this should be brought to the attention of the Battalions so they can take additional measures to stress safety consciousness during their final months of deployment.

**APPENDIX A**

**DIRECT LABOR QUESTIONNAIRE**



**DIRECT LABOR QUESTIONNAIRE**

This questionnaire is designed to collect data for the THIRD Naval Construction Brigade. The data will be compiled to establish an up-to-date availability factor which is used by the THIRD NCB to determine the number of mandays tasked to a NMCB. The availability factor estimates the amount of time you spend on the project site actually working. It does not measure your efficiency, but rather tries to account for all of the other activities which you undertake during the day, such as breaks, PT and safety lectures. To accomplish this you will be asked about your activities during normal working hours over the past month. You do not have to put your name on the questionnaire and the individual survey sheets will be treated as confidential. The questionnaire should take about 20 minutes to complete. Please take your time. It is very important that you read the questions carefully and provide the most accurate information you can. Unless otherwise instructed, consider the most recent work week when answering the questionnaire. If you are not sure of an answer, make your best estimate. Your answers will not change any aspect of your current deployment, but may shape the tasking of future battalions deploying to Okinawa. You have been chosen to complete this survey because of your excellent reputation and success thus far on your present deployment. Thank you for your time and good luck with the remainder of your deployment.

1. What project are you currently working on? \_\_\_\_\_
2. How many personnel are on your crew? \_\_\_\_\_
3. What is your position on the crew (ex. crew leader, crew member) ? \_\_\_\_\_
4. What time do you usually arrive at the job site on non-PT days? \_\_\_\_\_
5. What time do you usually arrive at the job site on PT days? \_\_\_\_\_
6. How many times have you been treated at Medical during normal working hours in the past week? \_\_\_\_\_
7. To the nearest 1/4 hour, estimate the total amount of time you were absent from the job site for Medical visits (ex. 1-1/4 hours, 2-3/4 hours). \_\_\_\_\_
8. How many times have you been treated at Dental during normal working hours in the past month? \_\_\_\_\_
9. To the nearest 1/4 hour, estimate the total amount of time you were absent from the job site for Dental visits. \_\_\_\_\_
10. How many times have you been assisted at Admin, Personnel and/or Legal during normal working hours in the past week? \_\_\_\_\_
11. To the nearest 1/4 hour, estimate the total amount of time you were absent from the job site for these visits. \_\_\_\_\_

12. How often and for how long do you take breaks during the work day? (ex. 2 times per day for 15 minutes each) \_\_\_\_\_
13. What time do you actually leave the job site to go to lunch? \_\_\_\_\_
14. What time do you actually arrive back on the job site after lunch? \_\_\_\_\_
15. What time do you actually depart the job site at the end of the day? \_\_\_\_\_
16. Do you have any collateral duties which take you away from the job site during normal working hours? If yes, please list them. \_\_\_\_\_
17. If yes, how many hours per week, during normal working hours do you spend attending to your collateral duties? (Estimate to the nearest 1/4 hour.) \_\_\_\_\_
18. How many days of leave have you taken in the past month? \_\_\_\_\_
19. How much, if any, special liberty have you taken in the last month? \_\_\_\_\_
20. How much time, if any, was lost on your project in the last week due to accidents or safety mishaps? (Estimate to the nearest 1/4 hour.) \_\_\_\_\_
21. How much time does your crew spend on safety lectures each day? \_\_\_\_\_
22. On pay days, how much additional time, if any, are you given to spend on personal business? \_\_\_\_\_
23. During the last week, how much personal time have you been granted during normal working hours (ex. time off for hair cuts, exchange runs)? \_\_\_\_\_
24. On a duty day, what time do you arrive at the job site? (Include sleep-in time if applicable.) \_\_\_\_\_
25. On a duty day, what time do you depart from the job site to prepare for duty? \_\_\_\_\_

Thank you very much for your time and effort.

### Instructions to the Survey Proctor

This questionnaire is designed to be completed by direct labor personnel only. Approximately 50% of the main body direct labor should be surveyed. If possible, all crew leaders should be included in the survey. The questionnaire asks the respondents to recall approximate times and activities from their recent work. It is imperative that the survey be completed on a day which was preceded by a normal workday. A Friday afternoon or Training Saturday is most preferable. The survey should take approximately 20 minutes to complete. The need to provide the most accurate information possible should be stressed to the Seabees completing the survey.

The following should be read to all survey participants:

"This questionnaire is designed to collect data for the THIRD Naval Construction Brigade. The data will be compiled to establish an up-to-date availability factor which is used by the THIRD NCB to determine the number of mandays tasked to a NMCB. The availability factor estimates the amount of time you spend on the project site actually working. It does not measure your efficiency, but rather tries to account for all of the other activities which you undertake during the day, such as breaks, PT and safety lectures. To accomplish this you will be asked about your activities during normal working hours over the past month. You do not have to put your name on the questionnaire and the individual survey sheets will be treated as confidential. The questionnaire should take about 20 minutes to complete. Please take your time. It is very important that you read the questions carefully and provide the most accurate information you can. Unless otherwise instructed, consider the most recent work week when answering the questionnaire. Your answers will not change any aspect of your current deployment, but may shape the tasking of future battalions deploying to Okinawa. You have been chosen to complete this survey because of your excellent reputation and success thus far on your present deployment. Thank you for your time and good luck with the remainder of your deployment."

I have enclosed 75 copies of the questionnaire and an envelope for their return. Please return them as soon as possible after they are completed. Thank you for your assistance.

Mark Libonate  
LT, CEC, USN  
NMCB-74 (1987-89)

**APPENDIX B**

**OPERATIONS OFFICER QUESTIONNAIRE**

**OPERATION'S OFFICER SURVEY**

Please provide as accurate information as possible. If possible, please support answers regarding Battalion policy with copies of applicable notices, instructions and reports.

1. What is the Battalion's work schedule? (Please list day of the week and normal working hours.)

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2. At what time are quarters held and until what time do they usually last? \_\_\_\_\_

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3. What is the Battalion's Physical Training (PT) schedule? (Please list day of the week and times.)

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4. Is remedial PT held during normal working hours? If yes, please list day of the week and times held.

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5. If yes, how many direct labor personnel are currently on the program? \_\_\_\_\_

6. How many Physical Readiness Tests (PRT) will be held during your current deployment? \_\_\_\_\_

---

7. Will the PRT be held during normal working hours (Do not consider Training Saturdays as normal working hours)? \_\_\_\_\_

---

8. If yes, what length of time, to the nearest 1/4 hour, will be required to complete the testing? \_\_\_\_\_

---

9. When and how often are working uniform personnel inspections held? \_\_\_\_\_

---

---

10. When held, at what time do regular personnel inspections conclude? \_\_\_\_\_

---

11. Will, or have, any Dress uniform inspections be held during the deployment? \_\_\_\_\_

---

12. If yes, how many inspections will be held and what length of time, to the nearest 1/4 hour, will be required to complete the inspection(s)? \_\_\_\_\_

---

13. How many direct labor personnel have been treated by Medical during the past week? \_\_\_\_\_

---

14. On average, how long does treatment of these personnel take? \_\_\_\_\_

---

14. On average, how long does treatment of these personnel take? \_\_\_\_\_
15. How many direct labor personnel are currently on the no duty roster due to illness? \_\_\_\_\_
16. How many direct labor personnel have been treated by Dental during the past week? \_\_\_\_\_
17. On average, how long does treatment of these personnel take? \_\_\_\_\_
18. How many direct labor personnel are currently in the brig or in a restricted/ no duty status? \_\_\_\_\_
19. What is the Battalion's leave policy during deployment? \_\_\_\_\_
20. How many direct labor personnel are currently on leave (including emergency leave)? \_\_\_\_\_
21. How many lost time accidents have occurred during the past month? (Please list number of direct labor personnel involved and the lost time for each.) \_\_\_\_\_
22. How many safety mishaps involving OF-13 personnel were reported during the last month? \_\_\_\_\_
23. Was 762-gear issue completed during normal working hours and, if so, what was the approximate time required for each man to complete his issue? \_\_\_\_\_
24. What is the Battalion's indoctrination policy? \_\_\_\_\_
25. How long does it take from the time a Seabee checks onboard until he is assigned to and actually begins work on a crew? \_\_\_\_\_
26. How many direct labor personnel transferred into the Battalion during the last month? \_\_\_\_\_
27. How many days prior to his detachment date is a Seabee relieved from his normal duties as a member of a project crew? \_\_\_\_\_
28. How many direct labor personnel transferred out of the Battalion during the past month? \_\_\_\_\_

29. What is the daily routine on paydays? How much, if any, extra time are personnel given to receive checks and take care of personal business? \_\_\_\_\_

\_\_\_\_\_

30. What is the Battalion's policy regarding special liberty? \_\_\_\_\_

\_\_\_\_\_

31. Is special liberty granted on a regular basis as part of any incentive or awards programs (i.e. re-enlistments, personnel inspections, etc.)? \_\_\_\_\_

32. If yes, how often are the awards given and for how much special liberty (24 hrs., 48 hrs.)? \_\_\_\_\_

\_\_\_\_\_

33. How many direct labor personnel re-enlisted during the past six months? \_\_\_\_\_

\_\_\_\_\_

34. Do you anticipate any full Battalion MWR functions (such as the over-the-hump party, picnics, boxing smokers, etc.) occurring on normal work days? If yes, please list each event and its expected duration to the nearest 1/4 day. \_\_\_\_\_

\_\_\_\_\_

35. What are your total available work days during this deployment to Okinawa? (Please provide breakdown by month.) \_\_\_\_\_

\_\_\_\_\_

36. Please provide a breakdown by rating of the total number of direct labor personnel at your site.

37. Please provide copies of your monthly SITREPs for this deployment.

Thank you very much for your time and effort.

**APPENDIX C**  
**NMCB LOST TIME ACCIDENT SUMMARY**

**LOST TIME MANDAYS PER MONTH**

Battalion	Month of Deployment							Total	Average
	1	2	3	4	5	6	7		
NMCB 74									
MAR 93-SEP 93	2	1	4	5	8	14	11	45	6.9
NMCB 7									
AUG 92-MAR 93	3	2	8	2	9	14	5	43	6.6
NMCB 5									
JAN 92-AUG 92	0	5	9	7	2	22	4	49	7.5

Source: Honkomp 25SEP93; NMCB-7 DCR; NMCB-5 DCR.



**APPENDIX D**

**DIRECT LABOR QUESTIONNAIRE DATA BASE**

### Data Base Legend

This legend is applicable for both the raw and purged Direct Labor Questionnaire Data Bases. Each numbered row (1 through 64) represents a returned questionnaire. A description for each column and its contents are shown below. All time values are given in hour:minute format.

Column Title	Description
PROJECT	Project to which Respondent was Assigned
	<u>Value</u> <u>Project Name</u>
	1.00 JK3-500 CAMP SHIELDS PARKING LOT
	2.00 MCD-110-93 REVAMP PSE
	3.00 JK3-308 CAMP MAINTENANCE - VARIOUS
	4.00 MCD-022-93 INSTALL ARMORY CAGE
	5.00 MCD-124-93 CPO BARRACKS REPAIR
	6.00 MCD-139-93 CONSTRUCT CTR BOXES
	7.00 MCD-096-93 INSTALL HAND RAIL
	8.00 MCD-000-93 DRAINAGE TRENCH
	9.00 JK3-500 TIRE HOUSE
	10.00 JK3-500 REVETMENT WALL KADENA AFB
	11.00 JK2-855 HAZ MAT STORAGE
	12.00 JK3-500 CO DISCRETIONARY VARIOUS
	13.00 JK3-500 CO DISCRETIONARY VARIOUS
	14.00 JK9-826 PASS OFFICE CAMP FOSTER
CREW	Number of Personnel on Crew
TITLE	Respondent's Position on Crew
	<u>Value</u> <u>Label</u>
	1.00 PROJECT SUPERVISOR
	2.00 CREW LEADER
	3.00 CREW MEMBER
STNONPT	Time of Arrival on Job Site, Non-PT Day
STPT	Time of Arrival on Job Site, PT Day
MEDICAL	Number of Medical Visits
MEDTIME	Time Spent on Medical Visits
DENTAL	Number of Dental Visits
DENTIME	Time Spent on Dental Visits
ADMIN	Number of Visits to Admin Offices
ADMINTIM	Time Spent on Admin Visits
BREAKS	Amount of Time Spent on Breaks
DPTLUNCH	Time Crew Departs the Job Site For Lunch
RTNLUNCH	Time Crew Returns From Lunch
ENDDAY	Time Crew Departs Job Site at End of Day

COLLDUTY	Collateral Duties
	<u>Value</u> <u>Label</u>
	0.00 NO
	1.00 YES
CDTIME	Time Spent on Collateral Duties
LEAVE	Time Spent on Leave
SPECLIB	Time Spent on Special Liberty
ACCIDENT	Lost Time Due to Accidents
SAFETY	Time Spent on Daily Safety Lectures
PAYDAY	Additional Time Allowed on Paydays
PERSONAL	Personal Time Granted
STDUTY	Time of Arrival on Job Site, Duty Day
DPTDUTY	Time of Departure from Job Site, Duty Day

	project	crew	title	stronpt	stpt	medical	medtime	dental	dentime
1	1.00	8.00	2.00	6:00	7:35	.00	0:00	.00	0:00
2	1.00	7.00	3.00	7:30	7:30	.00	0:00	.00	0:00
3	1.00	7.00	3.00	7:45	7:45	.00	0:00	.00	0:00
4	1.00	8.00	1.00	7:00	7:45	.00	0:00	1.00	0:45
5	2.00	2.00	2.00	8:00	8:30	.00	0:00	.00	0:00
6	2.00	1.00	3.00	8:00	8:30	.00	0:00	.00	0:00
7	3.00	1.00	3.00	7:00	7:30	.00	0:00	.00	0:00
8	3.00	7.00	1.00	7:00	7:30	.00	0:00	.00	0:00
9	3.00	2.00	3.00	7:30	7:30	.00	0:00	2.00	2:00
10	4.00	2.00	2.00	7:15	8:15	.00	0:00	.00	0:00
11	4.00	2.00	3.00	7:15	7:53	.00	0:00	1.00	0:00
12	5.00	2.00	2.00	7:10	7:45	1.00	1:00	3.00	3:00
13	5.00	2.00	3.00	7:10	8:05	.00	0:00	.00	0:00
14	6.00	4.00	3.00	6:45	7:30	.00	0:00	.00	0:00
15	6.00	3.00		6:45	7:30	.00	0:00	.00	0:00
16	6.00	5.00	2.00	7:00	7:30	.00	0:00	.00	0:00
17	6.00	3.00	3.00	6:30	7:30	.00	0:00	.00	0:00
18	7.00	3.00	3.00	7:00	8:00	.00	0:00	.00	0:00
19	7.00	3.00	2.00	7:00	8:00	.00	0:00	.00	0:00
20	8.00	5.00	3.00	7:30	7:30	.00	0:00	.00	0:00
21	8.00	5.00	3.00	7:30	7:30	1.00	0:30	.00	0:00
22	8.00	5.00	2.00	7:30	7:30	1.00	0:30	.00	0:00
23	8.00	5.00	3.00	7:30	8:00	.00	0:00	.00	0:00
24	9.00	3.00	3.00	7:30	7:30	.00	0:00	.00	0:00
25	9.00	3.00	3.00	8:30	8:30	.00	0:00	1.00	1:00
26	9.00	3.00	2.00	7:15	8:15	.00	0:00	.00	0:00
27	10.00	6.00	1.00	8:00	8:10	.00	0:00	.00	0:00
28	10.00	6.00	2.00	7:30	8:00	.00	0:00	.00	0:00
29	10.00	7.00	3.00	8:00	8:00	.00	0:00	3.00	2:00
30	10.00	6.00	3.00	8:00	8:30	.00	0:00	.00	0:00
31	11.00	5.00	1.00	7:00	7:00	.00	0:00	1.00	1:15
32	11.00	5.00	3.00	7:00	7:00	.00	0:00	.00	0:00

	admin	adminim	breaks	dptlunch	rintlunch	endday	collduty	cdtime	leave
1	.00	0:00	0:40	11:00	12:00	17:15	.00	0:00	.00
2	.00	0:00	1:00	11:00	12:00	17:00	.00	0:00	.00
3	.00	0:00	0:50	10:50	12:00	16:55	.00	0:00	.00
4	.00	0:00	0:50	11:00	12:00	17:00	.00	0:00	.00
5	.00	0:00	1:00	11:00	11:50	16:45	.00	0:00	.00
6	.00	0:00	0:10	11:00	12:00	17:00	.00	0:00	.00
7	.00	0:00	0:30	11:00	11:45	17:00			.00
8	.00	0:00		11:00	12:00	16:15	1.00	3:45	.00
9	.00	0:00	0:30	11:00	12:00	17:00	1.00	1:00	.00
10	.00	0:00	1:00	10:58	12:00	16:57	.00	0:00	.00
11	.00	0:00	0:40	10:59	11:59	17:05	1.00	1:00	.00
12	1.00	0:15	0:30	10:55	12:05	16:45	.00	0:00	.00
13	.00	0:00		10:45	12:10	16:40	.00	0:00	.00
14	.00	0:00	0:30	11:00	11:45	17:00	.00	0:00	.00
15	2.00	1:00	0:30	11:08	12:00	17:00	.00	0:00	.00
16	1.00	1:00	0:30	11:00	12:05	17:15	1.00	12:00	.00
17	.00	0:00	0:00	11:00	12:00	17:15	.00	0:00	.00
18	.00	0:00	0:30	10:45	12:00	16:45	.00	0:00	.00
19	1.00	0:15	0:30	10:45	12:00	16:45	1.00	3:00	.00
20	.00	0:00	0:25	11:00	12:00	17:00	.00	0:00	.00
21	.00	0:00	0:50	11:00	12:00	17:00	.00	0:00	.00
22	.00	0:00	0:45	11:00	12:00	17:00	.00	0:00	.00
23	2.00	2:00	0:50	11:00	12:00	17:00	.00	0:00	.00
24	.00	0:00	1:00	11:00	11:30	16:30	1.00	2:30	.00
25	.00	0:00		11:00	11:45	16:30	.00	0:00	.00
26	.00	0:00	1:30	11:00	12:00	16:55	.00	0:00	.00
27	1.00	0:15	0:30	11:30	12:20	17:00	.00	0:00	.00
28	.00	0:00	1:00	11:00	11:45	16:45	.00	0:00	.00
29	.00	0:00	1:00	11:00	11:45	16:30	.00	0:00	.00
30	.00	0:00	0:30	11:00	12:00	16:30	.00	0:00	.00
31	.00	0:00	0:25	11:45	12:45	17:15	.00	0:00	.00
32	.00	0:00	0:20	11:30	12:00	17:15	.00	0:00	.00

	specib	accident	safety	payday	personal	stduty	dptduty
1	0:00	0:00	0:15	0:30	0:00	8:00	17:00
2	0:00	0:00	0:05	0:00	0:00	7:30	16:45
3	0:00	0:00	0:10	0:30	0:00	8:00	16:45
4	0:00	0:00	0:05	0:30	1:00	7:30	17:00
5	0:00	0:00		0:00	0:00	8:00	16:45
6	0:00	0:00	0:30	0:00	0:00	9:00	16:45
7	0:00	0:00	0:15	0:30	0:30	7:00	16:45
8	0:00	0:00	0:15	0:30	0:00	8:00	16:45
9	0:00	0:00	0:15	1:00	1:00	7:30	16:45
10	0:00	0:00	0:15	0:00	0:00	9:00	16:30
11	0:00	0:00	0:10		0:00		16:45
12	0:00	0:00	0:13	0:00	2:00	8:00	16:45
13	0:00	0:00	0:10	0:00	0:20	7:10	16:40
14	0:00	0:00	0:05			12:00	15:45
15	0:00	0:00	0:05	0:30	0:00	12:00	17:00
16	8:00	1:00	0:08	0:00	4:00	7:15	17:00
17	0:00	0:00	0:15	0:00	0:00	9:00	17:15
18	0:00	0:00	0:08	0:00	0:30	7:00	16:45
19	0:00	0:00	0:08	0:00	0:30	9:00	16:45
20	23:59	0:00	0:15	0:00	0:00	9:00	16:30
21	23:59	0:00	0:15	0:00	0:00	12:00	16:30
22	0:00	0:00	0:15	0:00	0:00	9:00	16:30
23	0:00	0:00	0:15	0:00	0:00	12:00	16:30
24	0:00	0:00	0:10	0:00	0:00	7:30	16:30
25	0:00	0:00	0:08	0:30	0:00	12:00	16:30
26	0:00	0:00	0:08	0:00	0:00	9:00	16:30
27	0:00	0:00	0:15	0:00	0:00		16:50
28	0:00	0:00	0:08	0:30	0:00	7:30	16:45
29	0:00	0:00	0:15	0:00	0:00	8:00	16:00
30	23:59		0:10	1:30		8:00	16:30
31	0:00	0:00	0:13	0:30	1:00		
32	0:00	0:00	0:13	0:30	0:30		

	project	crew	title	stnoprpt	stpt	medical	medtime	dental	dentime
33	11.00	5.00	2.00	7:00	7:00	.00	0:00	.00	0:00
34	11.00	5.00	3.00	7:00	7:00	.00	0:00	.00	0:00
35	11.00	5.00	3.00	7:00	7:00	.00	0:00	.00	0:00
36	12.00	3.00	2.00	8:00	8:30	.00	0:00	.00	0:00
37	12.00	7.00	3.00	7:30	8:30	1.00	0:45	.00	0:00
38	13.00	8.00	3.00	8:00	8:00	.00	0:00	.00	0:00
39	13.00	8.00	3.00	8:00	8:00	.00	0:00	.00	0:00
40	14.00	8.00	3.00	7:45	7:45	.00	0:00	.00	0:00
41	14.00	5.00	2.00	7:45	8:15	.00	0:00	.00	0:00
42	14.00	8.00	2.00	7:08	7:53	.00	0:00	.00	0:00
43	14.00	8.00	3.00	8:00	8:00	.00	0:00	.00	0:00
44	14.00	8.00	1.00	7:45	7:45	.00	0:00	.00	
45	14.00	4.00	3.00	7:45	7:45	.00	0:00	.00	0:00
46	14.00	8.00	3.00	7:45	7:45	.00	0:00	.00	0:00
47	14.00	8.00	1.00	7:30	8:00	.00	0:00	1.00	1:00
48	14.00	8.00	3.00	7:45	7:45	.00	0:00	.00	0:00
49	14.00	9.00	3.00	7:00	8:00	.00	0:00	.00	0:00
50	14.00	8.00	3.00	7:45	7:30	.00	0:00	.00	0:00
51	14.00		3.00	7:45	7:45	.00	0:00	.00	0:00
52	14.00	7.00	3.00	7:00	8:00	2.00	4:00	.00	0:00
53	14.00	9.00	3.00	7:00	7:30	.00	0:00	1.00	1:00
54	14.00	8.00	3.00	7:00	7:00	.00	0:00	.00	0:00
55	14.00	2.00	2.00	7:30	7:30	.00	0:00	.00	0:00
56	14.00	8.00	2.00	7:00	7:30	.00	0:00	.00	0:00
57	14.00	4.00	3.00	8:00	8:30	.00	0:00	.00	0:00
58	14.00	7.00	3.00	7:15	7:45	.00	0:00	.00	0:00
59	14.00	7.00	3.00	7:15	7:45	.00	0:00	.00	0:00
60	14.00	7.00	3.00	7:45	8:00	.00	0:00	.00	0:00
61	14.00	7.00	3.00	7:45	7:45	.00	0:00	.00	0:00
62	14.00	7.00	3.00	7:45	7:45	.00	0:00	.00	0:00
63	14.00	7.00	3.00	7:45	7:45	.00	0:00	.00	0:00
64	14.00	7.00	2.00	7:15	7:45	.00	0:00	.00	0:00

	admin	adminim	breaks	dptlunch	rtnlunch	endday	collduty	cdtime	leave
33	.00	0:00	0:20	11:45	12:45	17:15	.00	0:00	.00
34	.00	0:00	0:30	12:00	13:00	17:45	.00	0:00	.00
35	.00	0:00	0:20	12:00	12:45	17:30			.00
36	.00	0:00	0:30	11:00	11:30	16:30	.00	0:00	.00
37	.00	0:00	0:15	11:15	11:45	16:45	1.00	6:00	.00
38	.00	0:00	0:20	11:00	11:30	16:30	.00	0:00	.00
39	.00	0:00	0:20	11:00	11:30	16:30	.00	0:00	.00
40	.00	0:00	0:30	11:00	12:00	16:30	.00	0:00	.00
41	.00	0:00	0:45	11:15	12:15	16:38	.00	0:00	.00
42	.00	0:00	0:20	11:30	12:03	16:45	1.00	0:15	.00
43	.00	0:00		11:30	12:30	17:00	.00	0:00	.00
44	.00		0:30	11:08	12:23	16:15	.00	0:00	.00
45	.00	0:00	1:15	11:30	12:30	16:45	.00	0:00	.00
46	4.00	10:00	1:15	11:00	12:00	16:45	.00	0:00	.00
47	.00	0:00		11:30	12:30	17:00	1.00	0:30	.00
48	.00	0:00	0:20	11:30	12:30	17:00	1.00	4:00	.00
49	.00	0:00	0:20	11:30	12:30	17:00	.00	0:00	.00
50	.00	0:00	0:30	11:00	12:00	17:00	.00	0:00	.00
51	.00	0:00	0:20	11:30	12:30	17:00	.00	0:00	.00
52	.00	0:00		11:30	12:30	17:00	1.00	6:00	.00
53	.00	0:00	0:25	11:30	12:30	17:00	1.00	2:00	.00
54	.00	0:00		11:30	12:30	17:00	.00	0:00	.00
55	1.00	0:30	0:40	11:30	12:30	17:15	.00	0:00	.00
56	.00	0:00		11:30	12:30	17:30	.00	0:00	.00
57	.00	0:00	0:30	11:00	12:00	16:30	.00	0:00	.00
58	2.00	3:30		11:15	11:45	17:00	.00	0:00	.00
59	.00	0:00	0:38	11:15	12:15	17:00	.00	0:00	.00
60	.00	0:00	0:45	11:00	12:00	16:30	.00	0:00	.00
61	1.00	0:30	0:38	11:00	11:45	17:00	.00	0:00	.00
62	.00	0:00	0:38	11:00	11:45	17:00	.00	0:00	.00
63	.00	0:00	0:38	11:00	11:45	17:00	.00	0:00	.00
64	1.00	2:00	1:15	11:00	12:00	17:30	.00	0:00	.00



	specib	accident	safety	payday	personal	stduty	dptduty
33	0:00	0:00	0:30	0:00	0:00		
34	0:00	0:00	0:15	0:00	0:00		
35	0:00	0:00	0:08	0:30			
36	23:59	0:00	0:13	1:30	0:00	9:30	16:30
37	0:00	0:00	0:08	0:30	2:00	7:30	16:45
38	23:59	0:00		1:00	0:00	8:00	16:00
39	23:59	0:00	0:15	1:00	0:00	8:00	16:00
40	0:00	0:00	0:30	0:30	0:00	9:00	16:30
41	0:00	0:00	0:08	0:23	0:15	7:45	16:30
42	0:00	45:00	0:05	0:30	0:00	9:00	16:30
43	0:00	0:00	0:05	0:00	0:00	12:30	16:30
44	0:00	0:00	0:18	0:00	0:30	12:00	16:00
45	0:00	0:00	0:15	0:23	0:23	9:30	16:00
46	0:00	0:00	0:30	0:00	0:00		16:30
47	0:00	0:00	0:08	0:45	0:00	7:30	16:45
48	0:00	0:00	0:10	0:00	0:00		16:30
49	0:00	0:00	0:08	0:00	0:00	11:30	16:30
50	0:00	0:00	0:10	0:00	0:00	7:30	17:00
51	0:00	0:00	0:10	1:00	0:00	9:00	16:15
52	0:00	0:00	0:15	0:30	0:30	12:00	16:30
53	0:00	0:00	0:05	0:30	0:00	7:00	16:30
54	0:00	0:00	0:05	0:30	0:00	7:00	16:30
55	0:00	0:00	0:08	0:00	0:00	7:30	17:15
56	0:00	0:00	0:09	0:00	0:00	7:00	16:45
57	0:00	0:00	0:05	0:00	0:30	9:00	16:30
58	0:00	0:00	0:05	0:00	0:00		
59	0:00	0:00	0:05	0:00	0:30	7:15	17:00
60		0:00	0:08	0:00	0:00	11:00	16:30
61	0:00	0:00	0:05	0:30	0:00		17:00
62	0:00	0:00	0:05	0:30	0:00		16:53
63	0:00	0:00	0:05	0:30	0:00		16:45
64	0:00	0:45	0:08	0:30	1:00	9:45	16:45

**APPENDIX E**

**PURGED DIRECT LABOR QUESTIONNAIRE DATA BASE**

	project	crew	title	sthorpt	stpt	medical	medtime	dental	dentime
1	1.00	8.00	2.00		7:35	.00	0:00	.00	0:00
2	1.00	7.00	3.00	7:30	7:30	.00	0:00	.00	0:00
3	1.00	7.00	3.00	7:45	7:45	.00	0:00	.00	0:00
4	1.00	8.00	1.00	7:00	7:45	.00	0:00	1.00	0:45
5	2.00	2.00	2.00	8:00	8:30	.00	0:00	.00	0:00
6	2.00	1.00	3.00	8:00	8:30	.00	0:00	.00	0:00
7	3.00	1.00	3.00	7:00	7:30	.00	0:00	.00	0:00
8	3.00	7.00	1.00	7:00	7:30	.00	0:00	.00	0:00
9	3.00	2.00	3.00	7:30	7:30	.00	0:00	2.00	2:00
10	4.00	2.00	2.00	7:15	8:15	.00	0:00	.00	0:00
11	4.00	2.00	3.00	7:15	7:53	.00	0:00	1.00	0:00
12	5.00	2.00	2.00	7:10	7:45	1.00	1:00	3.00	3:00
13	5.00	2.00	3.00	7:10	8:05	.00	0:00	.00	0:00
14	6.00	4.00	3.00	6:45	7:30	.00	0:00	.00	0:00
15	6.00	3.00		6:45	7:30	.00	0:00	.00	0:00
16	6.00	5.00	2.00	7:00	7:30	.00	0:00	.00	0:00
17	6.00	3.00	3.00	6:30	7:30	.00	0:00	.00	0:00
18	7.00	3.00	3.00	7:00	8:00	.00	0:00	.00	0:00
19	7.00	3.00	2.00	7:00	8:00	.00	0:00	.00	0:00
20	8.00	5.00	3.00	7:30	7:30	.00	0:00	.00	0:00
21	8.00	5.00	3.00	7:30	7:30	1.00	0:30	.00	0:00
22	8.00	5.00	2.00	7:30	7:30	1.00	0:30	.00	0:00
23	8.00	5.00	3.00	7:30	8:00	.00	0:00	.00	0:00
24	9.00	3.00	3.00	7:30	7:30	.00	0:00	.00	0:00
25	9.00	3.00	3.00		8:30	.00	0:00	1.00	1:00
26	9.00	3.00	2.00	7:15	8:15	.00	0:00	.00	0:00
27	10.00	6.00	1.00	8:00	8:10	.00	0:00	.00	0:00
28	10.00	6.00	2.00	7:30	8:00	.00	0:00	.00	0:00
29	10.00	7.00	3.00	8:00	8:00	.00	0:00	3.00	2:00
30	10.00	6.00	3.00	8:00	8:30	.00	0:00	.00	0:00
31	11.00	5.00	1.00	7:00	7:00	.00	0:00	1.00	1:15
32	11.00	5.00	3.00	7:00	7:00	.00	0:00	.00	0:00

	admin	admintim	breaks	dptlunch	rtntlunch	endday	collduty	cdtime	leave
1	.00	0:00	0:40	11:00	12:00	17:15	.00	0:00	.00
2	.00	0:00	1:00	11:00	12:00	17:00	.00	0:00	.00
3	.00	0:00	0:50	10:50	12:00	16:55	.00	0:00	.00
4	.00	0:00	0:50	11:00	12:00	17:00	.00	0:00	.00
5	.00	0:00	1:00	11:00	11:50	16:45	.00	0:00	.00
6	.00	0:00	0:10	11:00	12:00	17:00	.00	0:00	.00
7	.00	0:00	0:30	11:00	11:45	17:00			.00
8	.00	0:00		11:00	12:00		1.00	3:45	.00
9	.00	0:00	0:30	11:00	12:00	17:00	1.00	1:00	.00
10	.00	0:00	1:00	10:58	12:00	16:57	.00	0:00	.00
11	.00	0:00	0:40	10:59	11:59	17:05	1.00	1:00	.00
12	1.00	0:15	0:30	10:55	12:05	16:45	.00	0:00	.00
13	.00	0:00		10:45	12:10	16:40	.00	0:00	.00
14	.00	0:00	0:30	11:00	11:45	17:00	.00	0:00	.00
15	2.00	1:00	0:30	11:08	12:00	17:00	.00	0:00	.00
16	1.00	1:00	0:30	11:00	12:05	17:15	1.00	12:00	.00
17	.00	0:00		11:00	12:00	17:15	.00	0:00	.00
18	.00	0:00	0:30	10:45	12:00	16:45	.00	0:00	.00
19	1.00	0:15	0:30	10:45	12:00	16:45	1.00	3:00	.00
20	.00	0:00	0:25	11:00	12:00	17:00	.00	0:00	.00
21	.00	0:00	0:50	11:00	12:00	17:00	.00	0:00	.00
22	.00	0:00	0:45	11:00	12:00	17:00	.00	0:00	.00
23	2.00	2:00	0:50	11:00	12:00	17:00	.00	0:00	.00
24	.00	0:00	1:00	11:00	11:30	16:30	1.00	2:30	.00
25	.00	0:00		11:00	11:45	16:30	.00	0:00	.00
26	.00	0:00		11:00	12:00	16:55	.00	0:00	.00
27	1.00	0:15	0:30	11:30	12:20	17:00	.00	0:00	.00
28	.00	0:00	1:00	11:00	11:45	16:45	.00	0:00	.00
29	.00	0:00	1:00	11:00	11:45	16:30	.00	0:00	.00
30	.00	0:00	0:30	11:00	12:00	16:30	.00	0:00	.00
31	.00	0:00	0:25	11:45	12:45	17:15	.00	0:00	.00
32	.00	0:00	0:20	11:30	12:00	17:15	.00	0:00	.00

	specib	accident	safety	payday	personal	stduty	dptduty
1	0:00	0:00	0:15	0:30	0:00		17:00
2	0:00	0:00	0:05	0:00	0:00	7:30	16:45
3	0:00	0:00	0:10	0:30	0:00	9:00	16:45
4	0:00	0:00	0:05	0:30	1:00	7:30	17:00
5	0:00	0:00		0:00	0:00	8:00	16:45
6	0:00	0:00	0:30	0:00	0:00	9:00	16:45
7	0:00	0:00	0:15	0:30	0:30	7:00	16:45
8	0:00	0:00	0:15	0:30	0:00	9:00	
9	0:00	0:00	0:15	1:00	1:00	7:30	16:45
10	0:00	0:00	0:15	0:00	0:00	9:00	16:30
11	0:00	0:00	0:10		0:00		16:45
12	0:00	0:00	0:13	0:00	2:00	8:00	16:45
13	0:00	0:00	0:10	0:00	0:20	7:10	16:40
14	0:00	0:00	0:05			12:00	
15	0:00	0:00	0:05	0:30	0:00	12:00	17:00
16	8:00	1:00	0:08	0:00	4:00	7:15	17:00
17	0:00	0:00	0:15	0:00	0:00	9:00	17:15
18	0:00	0:00	0:08	0:00	0:30	7:00	16:45
19	0:00	0:00	0:08	0:00	0:30	9:00	16:45
20	23:59	0:00	0:15	0:00	0:00	9:00	16:30
21	23:59	0:00	0:15	0:00	0:00	12:00	16:30
22	0:00	0:00	0:15	0:00	0:00	9:00	16:30
23	0:00	0:00	0:15	0:00	0:00	12:00	16:30
24	0:00	0:00	0:10	0:00	0:00	7:30	16:30
25	0:00	0:00	0:06	0:30	0:00	12:00	16:30
26	0:00	0:00	0:06	0:00	0:00	9:00	16:30
27	0:00	0:00	0:15	0:00	0:00		16:50
28	0:00	0:00	0:08	0:30	0:00	7:30	16:45
29	0:00	0:00	0:15	0:00	0:00	8:00	16:00
30	23:59		0:10	1:30		8:00	16:30
31	0:00	0:00	0:13	0:30	1:00		
32	0:00	0:00	0:13	0:30	0:30		

	project	crew	title	stnonpt	stpt	medical	medtime	dental	dentime
33	11.00	5.00	2.00	7:00	7:00	.00	0:00	.00	0:00
34	11.00	5.00	3.00	7:00	7:00	.00	0:00	.00	0:00
35	11.00	5.00	3.00	7:00	7:00	.00	0:00	.00	0:00
36	12.00	3.00	2.00	8:00	8:30	.00	0:00	.00	0:00
37	12.00	7.00	3.00	7:30	8:30	1.00	0:45	.00	0:00
38	13.00	6.00	3.00	8:00	8:00	.00	0:00	.00	0:00
39	13.00	6.00	3.00	8:00	8:00	.00	0:00	.00	0:00
40	14.00	8.00	3.00	7:45	7:45	.00	0:00	.00	0:00
41	14.00	5.00	2.00	7:45	8:15	.00	0:00	.00	0:00
42	14.00	8.00	2.00	7:08	7:53	.00	0:00	.00	0:00
43	14.00	8.00	3.00	8:00	8:00	.00	0:00	.00	0:00
44	14.00	8.00	1.00	7:45	7:45	.00	0:00	.00	
45	14.00	4.00	3.00	7:45	7:45	.00	0:00	.00	0:00
46	14.00	8.00	3.00	7:45	7:45	.00	0:00	.00	0:00
47	14.00	8.00	1.00	7:30	8:00	.00	0:00	1.00	1:00
48	14.00	8.00	3.00	7:45	7:45	.00	0:00	.00	0:00
49	14.00	9.00	3.00	7:00	8:00	.00	0:00	.00	0:00
50	14.00	8.00	3.00	7:45	7:30	.00	0:00	.00	0:00
51	14.00		3.00	7:45	7:45	.00	0:00	.00	0:00
52	14.00	7.00	3.00	7:00	8:00	2.00	4:00	.00	0:00
53	14.00	9.00	3.00	7:00	7:30	.00	0:00	1.00	1:00
54	14.00	8.00	3.00	7:00	7:00	.00	0:00	.00	0:00
55	14.00	2.00	2.00	7:30	7:30	.00	0:00	.00	0:00
56	14.00	8.00	2.00	7:00	7:30	.00	0:00	.00	0:00
57	14.00	4.00	3.00	8:00	8:30	.00	0:00	.00	0:00
58	14.00	7.00	3.00	7:15	7:45	.00	0:00	.00	0:00
59	14.00	7.00	3.00	7:15	7:45	.00	0:00	.00	0:00
60	14.00	7.00	3.00	7:45	8:00	.00	0:00	.00	0:00
61	14.00	7.00	3.00	7:45	7:45	.00	0:00	.00	0:00
62	14.00	7.00	3.00	7:45	7:45	.00	0:00	.00	0:00
63	14.00	7.00	3.00	7:45	7:45	.00	0:00	.00	0:00
64	14.00	7.00	2.00	7:15	7:45	.00	0:00	.00	0:00

	admin	admtim	breaks	dptlunch	rtnlunch	endday	collduty	cdtime	leave
33	.00	0:00	0:20	11:45	12:45	17:15	.00	0:00	.00
34	.00	0:00	0:30	12:00	13:00		.00	0:00	.00
35	.00	0:00	0:20	12:00	12:45	17:30			.00
36	.00	0:00	0:30	11:00	11:30	16:30	.00	0:00	.00
37	.00	0:00	0:15	11:15	11:45	16:45	1.00	6:00	.00
38	.00	0:00	0:20	11:00	11:30	16:30	.00	0:00	.00
39	.00	0:00	0:20	11:00	11:30	16:30	.00	0:00	.00
40	.00	0:00	0:30	11:00	12:00	16:30	.00	0:00	.00
41	.00	0:00	0:45	11:15	12:15	16:38	.00	0:00	.00
42	.00	0:00	0:20	11:30	12:03	16:45	1.00	0:15	.00
43	.00	0:00		11:30	12:30	17:00	.00	0:00	.00
44	.00		0:30	11:08	12:23		.00	0:00	.00
45	.00	0:00	1:15	11:30	12:30	16:45	.00	0:00	.00
46	4.00	10:00	1:15	11:00	12:00	16:45	.00	0:00	.00
47	.00	0:00		11:30	12:30	17:00	1.00	0:30	.00
48	.00	0:00	0:20	11:30	12:30	17:00	1.00	4:00	.00
49	.00	0:00	0:20	11:30	12:30	17:00	.00	0:00	.00
50	.00	0:00	0:30	11:00	12:00	17:00	.00	0:00	.00
51	.00	0:00	0:20	11:30	12:30	17:00	.00	0:00	.00
52	.00	0:00		11:30	12:30	17:00	1.00	6:00	.00
53	.00	0:00	0:25	11:30	12:30	17:00	1.00	2:00	.00
54	.00	0:00		11:30	12:30	17:00	.00	0:00	.00
55	1.00	0:30	0:40	11:30	12:30	17:15	.00	0:00	.00
56	.00	0:00		11:30	12:30	17:30	.00	0:00	.00
57	.00	0:00	0:30	11:00	12:00	16:30	.00	0:00	.00
58	2.00	3:30		11:15	11:45	17:00	.00	0:00	.00
59	.00	0:00	0:38	11:15	12:15	17:00	.00	0:00	.00
60	.00	0:00	0:45	11:00	12:00	16:30	.00	0:00	.00
61	1.00	0:30	0:38	11:00	11:45	17:00	.00	0:00	.00
62	.00	0:00	0:38	11:00	11:45	17:00	.00	0:00	.00
63	.00	0:00	0:38	11:00	11:45	17:00	.00	0:00	.00
64	1.00	2:00	1:15	11:00	12:00	17:30	.00	0:00	.00

	speclib	accident	safety	payday	personal	stduty	dptduty
33	0:00	0:00	0:30	0:00	0:00		
34	0:00	0:00	0:15	0:00	0:00		
35	0:00	0:00	0:08	0:30			
36	23:59	0:00	0:13	1:30	0:00	9:30	16:30
37	0:00	0:00	0:08	0:30	2:00	7:30	16:45
38	23:59	0:00		1:00	0:00	8:00	16:00
39	23:59	0:00	0:15	1:00	0:00	8:00	16:00
40	0:00	0:00	0:30	0:30	0:00	9:00	16:30
41	0:00	0:00	0:08	0:23	0:15	7:45	16:30
42	0:00	45:00	0:05	0:30	0:00	9:00	16:30
43	0:00	0:00	0:05	0:00	0:00	12:30	16:30
44	0:00	0:00	0:18	0:00	0:30	12:00	16:00
45	0:00	0:00	0:15	0:23	0:23	9:30	16:00
46	0:00	0:00	0:30	0:00	0:00		16:30
47	0:00	0:00	0:08	0:45	0:00	7:30	16:45
48	0:00	0:00	0:10	0:00	0:00		16:30
49	0:00	0:00	0:08	0:00	0:00	11:30	16:30
50	0:00	0:00	0:10	0:00	0:00		17:00
51	0:00	0:00	0:10	1:00	0:00	9:00	16:15
52	0:00	0:00	0:15	0:30	0:30	12:00	16:30
53	0:00	0:00	0:05	0:30	0:00	7:00	16:30
54	0:00	0:00	0:05	0:30	0:00	7:00	16:30
55	0:00	0:00	0:08	0:00	0:00	7:30	17:15
56	0:00	0:00	0:09	0:00	0:00	7:00	16:45
57	0:00	0:00	0:05	0:00	0:30	9:00	16:30
58	0:00	0:00	0:05	0:00	0:00		
59	0:00	0:00	0:05	0:00	0:30	7:15	17:00
60		0:00	0:08	0:00	0:00	11:00	16:30
61	0:00	0:00	0:05	0:30	0:00		17:00
62	0:00	0:00	0:05	0:30	0:00		16:53
63	0:00	0:00	0:05	0:30	0:00		16:45
64	0:00	0:45	0:08	0:30	1:00	9:45	16:45



## **APPENDIX F**

### **SUMMARY OF PROBLEMS AND RECOMMENDED SOLUTIONS**

**Table F.1. Problems and Recommended Solutions**

Category	Problem Statement	Recommended Solution
Definition	Current Navy instructions provide vague and inconsistent definitions of an availability factor and the loss time for which it accounts.	<ol style="list-style-type: none"> <li>1. Through NCF-wide coordination, develop an explicit definition of an availability factor. (See Section 1.2 for the author's definition.)</li> <li>2. Ensure consistency among all guidance when presenting this definition.</li> <li>3. As part of the definition, provide examples of activities which may reduce availability and which are accounted for by an availability factor. Ensure these examples are consistent with the accepted definition and throughout all guidance.</li> </ol>
Calculation	Current Navy guidance is not definitive in explaining how to calculate an availability factor.	<ol style="list-style-type: none"> <li>1. Develop NCF-wide policy on which man-days (project, training, contingency, etc.) and other elements are to be included in the calculation of an availability factor. (Section 5.2.(3) refers.)</li> <li>2. In all guidance requiring the calculation of an availability factor, provide a detailed explanation of each element to be included in the calculation. (Section 5.2.(3) refers.)</li> </ol>
Usage	Inconsistencies and lack of adequate guidance in current Navy instructions have led to much misunderstanding throughout the NCF in regards to the meaning and use of availability factors.	<ol style="list-style-type: none"> <li>1. Through NCF-wide coordination, develop an explicit definition of an availability factor. (See Section 1.2 for the author's definition.)</li> <li>2. Ensure consistency among all guidance when presenting this definition.</li> <li>3. Develop detailed guidance concerning the calculation of availability factors.</li> <li>4. In all guidance requiring the calculation of an availability factor, provide a detailed explanation of each element to be included in the calculation. (Section 5.2.(3) refers.)</li> <li>5. Provide more in-depth training in the calculation and application of availability factors for all levels of personnel within the NCF. Seabee Construction Management and Prospective Operations Officers courses should target this training topic.</li> <li>6. At the NCB level, calculate site specific, average availability factors for each deployment site and use these factors in tasking NMCBs.</li> </ol>

**Table F.1. (cont.) Problems and Recommended Solutions**

Category	Problem Statement	Recommended Solution
Data Collection	There is currently no adequate system in place to collect and record accurate availability factors.	<ol style="list-style-type: none"> <li>1. Change the DCR format to include the reporting of availability factors at each deployment site for each month of a NMCB's deployment.</li> <li>2. In order to ensure consistency between NMCBs, provide detailed guidance governing the calculation of the availability factor to be reported.</li> <li>3. At the NCB level, develop a historical data base of the availability factors recorded at each deployment site and from this data base calculate average availability factors for each site.</li> <li>4. Change the SITREP format to include the data necessary to calculate availability on a monthly basis. (Section 5.2.5 refers.)</li> </ol>
Terminology	CBPAC/CBLANTINST 3121.1B requires the reporting of "efficiency" in DCR's and provides a formula for calculating "efficiency" which can be construed to be identical to the formula for calculating an availability factor.	<ol style="list-style-type: none"> <li>1. Delete the calculation and reporting of "efficiency" and require the reporting of availability.</li> </ol> <p style="text-align: center;">OR</p> <p>Provide a definition of the term "efficiency" and an explanation of the difference between efficiency and availability.</p>
Travel Time	Travel is currently recorded as direct labor though it produces no actual work and is not accounted for by an availability factor.	<ol style="list-style-type: none"> <li>1. Reclassify travel time as non-direct labor and provide a separate timekeeping code to count it.</li> <li>2. Account for the loss of direct labor due to travel time by including it in the availability factor.</li> <li>3. At the NCB level, adjust the average availability factors used in the project tasking process to reflect any extreme travel conditions expected to be encountered during a specific deployment.</li> </ol>

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## **VITA**

Mark Reynolds Libonate was born in Baltimore, Maryland on January 11, 1963, the son of Matthew Lewis Libonate and Ordelle Lowe Libonate. After completing his work at Picayune Memorial High School, Picayune, Mississippi, he entered the U.S. Naval Academy at Annapolis, Maryland. He received the degree of Bachelor of Science in Naval Architecture and was commissioned an Ensign in May of 1985. After completion of initial training at the Civil Engineer Corps Officer School, his tours include Contracts Department Head, LaMaddalena, Italy; Naval Mobile Construction Battalion SEVENTY-FOUR; Civil Engineer Corps Accessions Officer for the Eastern United States and Commanding Officer, Construction Battalion Maintenance Unit THREE ZERO TWO, Subic Bay, Philippines. In August 1992 he reported to the University of Texas at Austin to pursue a higher degree. In September of 1992, he was married to Maria Magdalena Rivada. He is currently registered as an Engineer-in-Training in the State of Maryland.

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